



Patent  
Attorney's Docket No. JNP-0238 (0023-0114)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Patent Application of	)	
	)	
Frank KASTENHOLZ	)	Group Art Unit: 2665
	)	
Application No.: 09/237,128	)	Examiner: Duc Chi Ho
	)	
Filed: January 25, 1999	)	
	)	
For: NETWORK PACKET	)	
FORWARDING LOOKUP WITH	)	
A REDUCED NUMBER OF	)	
MEMORY ACCESSES	)	

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**APPEAL BRIEF**

U.S. Patent and Trademark Office  
Customer Window, Mail Stop: Appeal Brief-Patents  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

This appeal is from the decision of the Primary Examiner dated November 9, 2004 finally rejecting claims 3-5, 7, 10, 11, 15-18, 21-24, 26-30 and 32-34, which are reproduced as an Appendix to this brief.

**I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is Juniper Networks, Inc.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

# Provisional Patent Application of

Frank KASTENHOLZ

Group Art Unit: 2665

Application No.: 09/237,128

Examiner: Duc Chi Ho

Filed: January 25, 1999

# For: NETWORK PACKET FORWARDING LOOKUP WITH A REDUCED NUMBER OF MEMORY ACCESSES

**TRANSMITTAL FOR APPEAL BRIEF**

U.S. Patent and Trademark Office  
Customer Service Window, Mail Stop Appeal Brief-Patents  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

Transmitted herewith is an Appeal Brief in support of the Notice of Appeal filed

February 8, 2005.

Enclosed is a check for ☐ \$250.00 ☒ \$500.00 to cover the Government fee.

The Commissioner is hereby authorized to charge any other appropriate fees that may be required by this paper that are not accounted for above, and to credit any overpayment, to Deposit Account No. 50-1070.

Respectfully submitted,

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Date: April 8, 2005

**II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS**

To the best of the knowledge of the undersigned, there are no other appeals, interferences or judicial proceedings known to the Appellant, the Appellant's legal representative, or the above-noted assignee that will directly affect or be directly affected by, or have a bearing on, the Board's decision in this appeal.

**III. STATUS OF CLAIMS**

Claims 3-5, 7, 10, 11, 15-18, 21-24, 26-30 and 32-34 are currently pending in the application. Claims 3-5, 7, 10, 11, 21-24, 26-30 and 32-34 are the subject of the present appeal.

**IV. STATUS OF AMENDMENTS**

An amendment after-final has been filed concurrently with the present appeal brief. This amendment after-final proposes canceling claims 15-18 to reduce issues for appeal.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 4 recites a method in a device for forwarding data packets, the device having a memory containing storage locations. The method includes receiving header data (152, FIG. 18; pg. 14, lines 18-20) of a network layer packet. The method includes selecting a first one of the storage locations (266, FIG. 18; pg. 14, lines 15-24) based on a first set of bits

contained in the header data (152, FIG. 18; pg. 14, lines 18-20) and executing an instruction ("opcode," FIG. 20; FIG. 18; pg. 14, lines 12-16) stored at the first selected storage location.

The method further includes selecting a second one of the storage locations (274, FIG. 19C; pg. 16, lines 11-17) based on the executed instruction and a second set of bits contained in the header data and selecting a third one of the storage locations (290, FIG. 19C; pg. 16, lines 11-17) based on contents of the second selected storage location and a third set of bits contained in the header data.

Claim 10 recites a method in a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address containing a sequence of bits. The method includes using a first set of bits from the destination address of the IP packet as an index to locate a first entry (266, FIG. 18; pg. 14, lines 15-24) in a first forwarding lookup that stores a first instruction ("opcode," FIG. 20; pg. 14, lines 12-16) and a first set of bits and executing the first instruction ("opcode," FIG. 20; pg. 14, lines 12-16) to, using the first set of bits, provide direction to a second forwarding lookup (274, FIG. 19A; pg. 14, lines 20-24), using a second set of bits from the destination address as an index to locate the second entry in a second forwarding lookup that stores a second instruction and a second set of bits. The method further includes executing the second instruction to provide direction, using the second set of bits, to a third forwarding lookup (290, FIG. 19C; pg. 16, lines 11-17) and employing a third set of bits from the destination address as an index to locate a third entry in the third forwarding lookup (290, FIG.

19C; pg. 16, lines 11-17) and employing the contents of the third entry in forwarding the IP packet.

Claim 21 recites a switch/router for directing IP packets toward destinations that includes a first lookup array (270, FIG. 19C; pg. 16, lines 11-17) containing entries indexed by leading bits of destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination. The switch/router further includes a second lookup array (274; FIG. 19C, pg. 16, lines 11-17) containing entries indexed by a successive set of bits that follow the leading bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination and a third lookup array (290, FIG. 19C; pg. 16, lines 11-17) containing entries indexed by a set of trailing bits that follow the successive set of bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet. The method also includes a forwarding engine (108, FIG. 8; pg. 9, line 21 – pg. 10, line 5) for forwarding IP packets to destinations, where for each IP packet being forwarded, said forwarding engine accesses at least one entry in the lookup arrays indexed by a portion of a destination address for the IP packet being forwarded and executing the instruction contained in the entry that is accessed.

Claim 24 recites, in a device for forwarding data packets wherein the device includes a storage having storage locations, a computer-readable medium holding computer-executable instructions for performing a method. The method includes using a first set of multiple bits from

header data for a network layer packet as an index to locate a selected first one (266, FIG. 18; pg. 14, lines 15-24) of the storage locations that stores a first instruction ("opcode," FIG. 20; pg. 14, lines 12-16) and executing the first instruction ("opcode," FIG. 20; pg. 14, lines 12-16) to provide, using a second set of multiple bits from the header data, a location of a second one (274, FIG. 19C) of the storage locations that stores a second instruction. The method further includes executing the second instruction to provide, using a third set of multiple bits from the header data, a location of a third one (290, FIG. 19C) of the storage locations, wherein the third one of the storage locations provides a third instruction regarding how the device should forward the network layer packet and executing the third instruction to forward the network layer packet toward the destination.

Claim 29 recites, in a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address composed of a sequence of bits, the device including a first forwarding lookup and a second forwarding lookup, a computer-readable medium holding computer-executable instructions for performing a method. The method includes using a prefix of multiple bits from the destination address of the IP packet as an index to locate a first entry (266, FIG. 18; pg. 14, lines 15-24) in the first forwarding lookup (264, FIG. 19; pg. 14, lines 20-24) that stores a first instruction and a first set of bits and executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup (274, FIG. 19A; pg. 14, lines 20-24), using a next sequential set of bits following the prefix in the destination address

as an index to locate a second entry in the second forwarding lookup, said second entry having contents. The method further includes employing the contents of the second entry in forwarding the IP packet toward the destination address (pg. 14, lines 7-9).

**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 32-34 stand rejected under U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement.

Claims 3-5, 21-23 and 32-34 stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 6,563,823 (hereinafter "PRZYGIENDA").

Claims 7, 10, 11, 15-18, 24 and 26-30 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over PRZYGIENDA in view of U.S. Patent No. 5,353,283 (hereinafter "TSUCHIYA").

**VII. ARGUMENT**

**A. The rejection of claims 32-34 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement should be reversed.**

To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. See Moba, B.V. v. Diamond Automation, Inc.,

325 F.3d 1306, 1319, 66 USPQ2d 1429, 1438 (Fed. Cir. 2003). See also M.P.E.P. § 2163.

Appellant respectfully submits that Appellant's patent specification describes the invention of claims 32-34 in sufficient detail that one skilled in the art can reasonably conclude that Appellant had possession of the claimed invention.

In rejecting claim 32 under 35 U.S.C. §112, first paragraph, the final Office Action alleges that the feature "retrieving, from a lookup element stored in a storage location of the storage locations, multiple bits that select the first set of bits from all of the bits contained in the header data" lacks support in Appellant's specification. Appellant traverses and submits that page 14, lines 16-23 and FIG. 18 clearly describe the subject matter of claims 32-34. Page 14, lines 16-23 of Appellant's specification discloses the following:

The lookup element 220 also contains an array address 252 and *a header nibble select 254. A nibble is 4 bits, and different nibbles within the header may be utilized to generate an index to an array lookup element in a lookup array. Information in the header, other than the destination address may be used for lookup, and the header nibble select 254 identifies what information to use for lookup.* The array address 252 identifies the location of the lookup array 264 and may be combined with the 16 address bits 260 to locate the lookup element 266 within the lookup array 264. (emphasis added)

As is apparent from the above cited portion of Appellant's specification, and from the depiction of the lookup element 220 in FIG. 18, the header nibble select 254 identifies (see pointer from header nibble select 254 to bits 260 in FIG. 18) which bits 260 in the packet header 152 that will be used, in conjunction with the array address 252, to locate the lookup element 266 within the lookup array 264 (see summation element in FIG. 18 that sums the array address 252 and the bits



260 from header 152 that are selected by the header nibble select 254). Appellant's specification, thus, provides support for the feature "retrieving, from a lookup element stored in a storage location of the storage locations, multiple bits that select the first set of bits from all of the bits contained in the header data," as recited in claim 32, contrary to the allegations of the Examiner.

Similarly, the final Office Action alleges that claims 33 and 34 lack support in the specification. Appellant traverses and submits that the above-noted sections of Appellant's specification, and pg. 14, lines 25-32, clearly describe the subject matter of claims 33 and 34. As discussed above, page 14, lines 16-23 of Appellant's specification describes the basic function of a "header nibble select" in an initial lookup array element 220 of an interface structure 210. As already discussed, the "header nibble select" identifies which bits in a packet header that will be used, in conjunction with an array address, to locate a lookup element within a lookup array. Pg. 14, lines 25-32 describe the following:

As shown in FIG. 20, this lookup element in the first forwarding lookup array 264 contains an array address, header nibble select and opcode. The opcode may direct the lookup engine 108 to another forwarding lookup array. Hence, the next successive lookup array must be accessed. FIG. 19A shows an example wherein a lookup element 272 in lookup array 264 identifies an array address for a second lookup array 274. The second lookup array 274 is indexed by the third byte within the destination address. The lookup elements in the second lookup array 274 include lookup elements 276 and 278 for the prefixes 1.2.3 and 1.2.4, respectively.

This section of Appellant's specification, thus, describes the use of "header nibble select" in lookup arrays subsequent to the initial lookup element 220 in interface structure 210.

Each subsequent lookup array accessed (e.g., lookup arrays 274 or 275 in FIG. 19A) is, thus, accessed by using the “header nibble select” to identify which bits in the packet header that will be used, in conjunction with the “array address,” to locate the next lookup element in the next lookup array (see FIG. 20). Appellant’s specification, thus, provides support for the feature “retrieving, from the first one of the storage locations, multiple bits that select the second set of bits from all of the bits contained in the header data,” as recited in claim 33, and “retrieving, from the second one of the storage locations, multiple bits that select the third set of bits from all of the bits contained in the header data,” as recited in claim 34.

Since Appellant’s specification sufficiently describes the invention recited in claims 32-34, reversal of the rejection of these claims under 35 U.S.C. §112, first paragraph, is respectfully requested.

**B. The rejection of claims 3-5, 21-23 and 32-34 under 35 U.S.C. §102(e) as allegedly being anticipated by PRZYGIENDA should be reversed.**

1. Claims 3-5.

A proper rejection under 35 U.S.C. §102(e) requires that a single reference teach every aspect of the claimed invention either expressly or impliedly. Any feature not directly taught

must be inherently present. See M.P.E.P. § 2131. Appellant respectfully submits that PRZYGIENDA does not disclose each and every feature recited in claim 4.

Independent claim 4 recites “[i]n a device for forwarding data packets, the device having a memory containing storage locations, a method comprising: receiving header data of a network layer packet; selecting a first one of the storage locations based on a first set of bits contained in the header data; executing an instruction stored at the first selected storage location; selecting a second one of the storage locations based on the executed instruction and a second set of bits contained in the header data; and selecting a third one of the storage locations based on contents of the second selected storage location and a third set of bits contained in the header data.”

In contrast to claim 4, PRZYGIENDA discloses a classless interdomain routing (CIDR) lookup algorithm that searches through a routing table 15 to find a longest prefix that matches a destination address retrieved from a data packet (see column 1, lines 59-65; column 2, line 55 – column 3, line 10). In rejecting claim 4, the final Office Action (pg. 3) alleges that PRZYGIENDA discloses “executing an instruction at the first selected storage location” and, in support thereof, asserts that PRZYGIENDA discloses the following:

[T]he forwarding devices uses a lookup algorithm to determine whether the matching prefix “124” of the selected location “124.X.X.X” matches the longest match rule. If “124” isn’t the longest match, the algorithm inherently continues to search for the next longer matching prefix.

Appellant submits that the final Office Action’s allegation fails to address an aspect of the above-noted feature of claim 4. Claim 4, among other features, recites “executing an instruction *stored*

at the first selected storage location” (emphasis added). The Examiner’s allegation does not address that the executed instruction is stored at the selected storage location.

As asserted by the final Office Action, PRZYGIENDA discloses the use of a lookup algorithm to determine a selected location in a routing table 16 that contains a longest matching prefix that matches a destination address of a packet (see column 2, line 59 – column 3, line 8). The forwarding device uses forwarding information associated with the longest matching prefix to route the packet to its next destination (column 3, lines 8-10). PRZYGIENDA, thus, discloses a lookup algorithm that searches through prefix entries in a routing table, and does not disclose, or even suggest, the execution of an instruction *stored* at a selected storage location. PRZYGIENDA, therefore, does not suggest or disclose “executing an instruction stored at the first selected storage location,” as recited in claim 4.

The final Office Action (pg. 4) further alleges that PRZYGIENDA discloses “selecting a second one of the storage locations based on the executed instruction and a second set of bits contained in the header data” and, in support thereof, asserts that PRZYGIENDA discloses the following:

[A] second match preference “2” – fig. 1 of the table is inherently selected as a second location basing on a second set of bits “124.13.” contained in the header data, see col. 3, lines 1-2.

According to this assertion of the Examiner, PRZYGIENDA, thus, discloses the selection of a second matching entry in routing table 16 based on additional bits contained in the packet’s

destination address. PRZYGIENDA, however, does not disclose, or even suggest, selecting a storage location based on an executed instruction *stored* at another storage location selected by a first set of bits contained in packet header data. PRZYGIENDA, thus, does not suggest or disclose “selecting a second one of the storage locations based on the executed instruction and a second set of bits contained in the header data,” as recited in claim 4.

In view of the arguments above, reversal of the rejection of claims 3-5 is requested.

## 2. Claims 21-23.

Claim 21 recites a “switch/router for directing IP packets toward destinations” that includes “a first lookup array containing entries indexed by leading bits of destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination;” “a second lookup array containing entries indexed by a successive set of bits that follow the leading bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination;” “a third lookup array containing entries indexed by a set of trailing bits that follow the successive set of bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet” and “a forwarding engine for forwarding IP packets to destinations, where for each IP packet being forwarded, said forwarding engine accesses at least one entry in the lookup

arrays indexed by a portion of a destination address for the IP packet being forwarded and executing the instruction contained in the entry that is accessed.”

As discussed above with respect to claim 4, PRZYGIENDA merely discloses a lookup algorithm that searches through a routing table 15 to find a longest prefix that matches a destination address retrieved from a data packet (see column 1, lines 59-65; column 2, line 55 – column 3, line 10). PRZYGIENDA does not disclose, or even suggest, the execution of an instruction contained in an entry of a lookup array and, thus, does not disclose “each entry containing an instruction to assist in forwarding an IP packet towards a destination” and “executing the instruction contained in the entry that is accessed,” as recited in claim 21. Reversal of the rejection of claim 21 is, therefore, respectfully requested.

### 3. Claim 32.

Dependent claim 32 recites “retrieving, from a lookup element stored in a storage location of the storage locations, multiple bits that select the first set of bits from all of the bits contained in the header data.” In rejecting claim 32, the final Office Action (pg. 4) alleges that PRZYGIENDA discloses this feature, asserting that “the algorithm used for the longest matching rule is capable of retrieving the multiple bits such as “124” among the “124.X.X.X.” As correctly noted by the final Office Action, PRZYGIENDA discloses matching a portion of a destination address (e.g., “124”) from a packet header with a prefix (e.g., “124.X.X.X”) stored in

a routing table 16. Matching a portion of a destination address with a routing table prefix, however, does not disclose, or even suggest, retrieving, from a lookup element stored in a storage location, multiple bits that select a first set of bits from all of the bits contained in the header data and selecting a first one of the storage locations based on the selected first set of bits, as recited in claim 32. Reversal of the rejection of dependent claim 32 is requested for at least this additional reason.

#### 4. Claim 33.

Dependent claim 33 recites “retrieving, from the first one of the storage locations, multiple bits that select the second set of bits from all of the bits contained in the header data.” In rejecting claim 33, the final Office Action (pg. 5) alleges that PRZYGIENDA discloses this feature, asserting that “the algorithm used for the longest matching rule is capable of retrieving the multiple bits such as “124.X” among the “124.X.X” that selects the second set of bits. As correctly noted by the final Office Action, PYZYGIENDA discloses matching a portion of a destination address (e.g., “124.X”) from a packet header with a prefix (e.g., “124.X.X”) stored in routing table 16. Matching a portion of a destination address with a routing table prefix, however, does not disclose, or even suggest, retrieving, from a first one of the storage locations, multiple bits that select the second set of bits from all of the bits contained in the header data, as

recited in claim 33. Reversal of the rejection of dependent claim 33 is requested for at least this additional reason.

5. Claim 34.

Dependent claim 34 recites “retrieving, from the second one of the storage locations, multiple bits that select the third set of bits from all of the bits contained in the header data.” In rejecting claim 34, the final Office Action (pg. 5) alleges that PRZYGIENDA discloses this feature, asserting that “the algorithm used for the longest matching rule is capable of retrieving the multiple bits such as “124.13.X” among the “124.13.X.X,” that selects the third set of bits.” As correctly noted by the final Office Action, PYZYGIENDA discloses matching a portion of a destination address (e.g., “124.13.X”) from a packet header with a prefix (e.g., “124.13.X.X”) stored in routing table 16. Matching a portion of a destination address with a routing table prefix, however, does not disclose, or even suggest, retrieving, from a second one of the storage locations, multiple bits that select the third set of bits from all of the bits contained in the header data, as recited in claim 34. Reversal of the rejection of claim 34 is requested for at least this additional reason.



**C. The rejection of claims 7, 10, 11, 24 and 26-30 under 35 U.S.C. §103(a) as unpatentable over PRZYGIENDA and TSUCHIYA should be reversed.**

1. Claims 7, 10 and 11.

In paragraph 7, the final Office Action rejects claims 7, 10 and 11 under 35 U.S.C. §103(a) as allegedly being unpatentable over PRZYGIENDA in view of TSUCHIYA. Appellant submits that the final Office Action has failed to establish a *prima facie* case of obviousness and, therefore, the rejection of these claims should be reversed.

As one requirement for establishing a *prima facie* case of obviousness, the reference (or references when combined) cited by the Office Action must teach or suggest all of the claim features. *In re Vaeck*, 947 F.2d 488, U.S.P.Q.2d 1438 (Fed. Cir. 1991). See M.P.E.P. § 2143. Appellant respectfully submits that the references cited by the Office Action, either singly or in combination, do not teach or suggest each and every feature of claim 10.

Independent claim 10 recites “[i]n a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address containing a sequence of bits, a method” that includes “using a first set of bits from the destination address of the IP packet as an index to locate a first entry in a first forwarding lookup that stores a first instruction and a first set of bits,” “executing the first instruction to, using the first set of bits, provide direction to a second forwarding lookup, using a second set of bits from the destination address as an

index to locate the second entry in a second forwarding lookup that stores a second instruction and a second set of bits,” “executing the second instruction to provide direction, using the second set of bits, to a third forwarding lookup,” and “employing a third set of bits from the destination address as an index to locate a third entry in the third forwarding lookup and employing the contents of the third entry in forwarding the IP packet.”

In rejecting claim 10, the final Office Action alleges that PRZYGIENDA discloses all of the features of the claims except “a first entry in a first forwarding lookup that stores a first instruction, and the second entry in a second forwarding lookup that stores a second instruction.” The final Office Action, however, alleges that TSUCHIYA discloses these features. In support of this allegation, the final Office Action (pg. 6) asserts the following:

Tsuchiya discloses a general Internet method for routing packets in a communications network. When a packet is received at an intermediary node, the intermediary node routes the packet by selecting a forwarding table. Then the intermediary node retrieves the indexed forwarding table entry, wherein the forwarding table entry may have an appropriate instruction stored therein for causing the pointer in the packet header to point to a different identifier, see column 4, lines 21-26.

Contrary to the allegations of the final Office Action, Appellant submits that PRZYGIENDA and TSUCHIYA do not disclose the combination of features recited in claim 10. TSUCHIYA discloses a routing technique that, instead of parsing a destination address of a packet at each node (i.e., the routing technique disclosed in PRZYGIENDA), employs a sequence of node identifiers, contained in each packet sent from a source node to a destination

node, for routing a packet hop by hop through a network (column 3, lines 51-57). The sequence of identifiers in each packet identifies each node in a route through the network between the source node and the destination node that is used for routing the packet (column 3, lines 56-59). As the packet traverses the network, each intermediary node that receives the packet routes the packet towards the packet's destination based on successive identifiers of the sequence of identifiers contained in the packet's header (column 3, lines 61-64). Each packet header includes a pointer that points to a particular identifier in the sequence of identifiers (column 3, lines 67-68). When the packet is received by an intermediary node in the network, the intermediary node uses the identifier of the sequence of identifiers in the packet header pointed to by the pointer as an index to access a forwarding table maintained in a memory at that intermediary node (column 4, lines 11-15). The intermediary node retrieves the indexed forwarding table entry, which further includes an instruction stored therein for causing the pointer in the packet header to point to a next identifier in the sequence of identifiers stored in the packet header (column 4, lines 19-16). The intermediary node modifies the pointer in the packet header to point to the next identifier in the sequence of identifiers stored in the packet header (column 4, lines 26-30).

TSUCHIYA, thus, discloses using an identifier of a sequence of identifiers contained in a packet header to index an entry in a forwarding table in a device memory. An instruction contained in the indexed entry is then executed to *cause the device to modify a pointer in the*

*packet header to point to a next identifier in the sequence of identifiers stored in the packet header.* The instruction in TSUCHIYA is, thus, executed to modify a pointer that points to a next identifier in a sequence of identifiers in a packet header and is not executed to provide direction to a second forwarding lookup table. TSUCHIYA, therefore, does not disclose, or even suggest, locating “a first entry in a first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to, using the first set of bits, provide direction to a second forwarding lookup,” as recited in claim 10.

As noted above, PRZYGIENDA merely discloses the use of a lookup algorithm to determine a selected location in a routing table 16 that contains a longest matching prefix that matches a destination address of a packet (see column 2, line 59 – column 3, line 8). The forwarding device uses forwarding information associated with the longest matching prefix to route the packet to its next destination (column 3, lines 8-10). PRZYGIENDA, thus, discloses searching through a routing table 16 to locate an entry that contains a longest prefix that matches a destination address of a packet, and then retrieval of forwarding information associated with the entry that contains the longest prefix. PRZYGIENDA does not disclose, or even suggest, locating “a first entry in a first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to, using the first set of bits, provide direction to a second forwarding lookup,” as recited in claim 10. The longest matching entry in the forwarding table of PRZYGIENDA contains a prefix that matches the

destination address from a packet, and does not store an instruction that is executed to provide direction to a second forwarding lookup, as recited in claim 10.

Since neither TSUCHIYA, nor PRZYGIENDA, disclose the features “using a first set of bits from the destination address of the IP packet as an index to locate a first entry in a first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to, using the first set of bits, provide direction to a second forwarding lookup,” Appellant submits that the final Office Action has failed to establish a *prima facie* case of obviousness. Reversal of the rejection of claim 10 is, therefore, requested for at least this reason.

A further requirement for establishing a *prima facie* case of obviousness is that there must be some reason, suggestion, or motivation to combine reference teachings. *In re Vaeck*, 947 F.2d 488, U.S.P.Q.2d 1438 (Fed. Cir. 1991). See M.P.E.P. § 2143. Appellant respectfully submits that the final Office Action has not provided a sufficient reason, suggestion, or motivation for combining the teachings of PRZYGIENDA and TSUCHIYA.

In rejecting claim 10, the final Office Action (pg. 6) alleges that “[o]ne skilled in the art would recognize the advantage of using Tsuchiya’s teaching of storing an instruction at an entry in a forwarding table into the system of Przygienda in order to provide direction such as causing the pointer in the packet header to point to a different identifier.” The final Office Action further alleges (pg. 6) that the suggestion/motivation for combining the disclosures of

PRZYGIENDA and TSUCHIYA “would have been to provide direction such as causing the pointer in the packet header to point to a different identifier.”

As noted above, PRZYGIENDA discloses the use of a destination address contained in a packet header to search through a routing table to locate an entry in the table that contains a longest prefix that matches the destination address of the packet. Forwarding information associated with the entry is then retrieved for forwarding the packet on to its network destination. The disclosure of PRZYGIENDA, thus, is based on the conventional packet forwarding principle of parsing the destination address of each received packet to locate a forwarding lookup entry that contains an appropriate next forwarding hop for the packet. As noted in column 3, lines 50-65, TSUCHIYA discloses a packet forwarding technique that operates on a completely different principle than the technique disclosed in PRZYGIENDA. TSUCHIYA discloses the use of a sequence of identifiers, inserted into the packet header, that *specify a route* for forwarding a packet hop by hop from a source to a destination (see column 3, lines 57-64).

Since PRZYGIENDA discloses a technique for forwarding packets that involves parsing a single destination address to locate a forwarding table lookup entry for routing the packet to a next hop, whereas TSUCHIYA discloses the use of a sequence of identifiers contained in a packet header for identifying a next forwarding hop for a packet, Appellant submits that one having ordinary skill in the art would not have been motivated to modify the

disclosure of PRZYGIENDA with the disclosure of TSUCHIYA. Given that PRZYGIENDA does not disclose the use of a sequence of identifiers in a packet header for providing a route between a source and destination, one skilled in the art would not have recognized “the advantage of using Tsuchiya’s teaching of storing an instruction at an entry in a forwarding table into the system of Przygienda in order to provide direction such as causing the pointer in the packet header to point to a different identifier” as alleged by the Office Action.

PRZYGIENDA does not disclose the use of any type of pointer in the packet header for pointing to routing identifiers within the packet header, therefore, one of ordinary skill in the art would not have combined the disclosures of PRZYGIENDA and TSUCHIYA “to provide direction such as causing the pointer in the packet head to point to a different identifier” as alleged by the final Office Action.

Furthermore, given that TSUCHIYA discloses the use of a sequence of identifiers in a packet header for routing a packet, instead of parsing a single destination address as disclosed in PRZYGIENDA, modifying PRZYGIENDA with the disclosure of TSUCHIYA would change the principle of operation of the forwarding technique disclosed in PRZYGIENDA. If a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Modifying the disclosure of PRZYGIENDA with the disclosure of

TSUCHIYA, which discloses routing a packet using a sequence of identifiers contained in the packet, would change the principle of operation by which PRZYGIENDA routes packets (i.e., parsing a packet's destination address to locate an entry in a forwarding table). Since the modification of PRZYGIENDA proposed by the Office Action would change the basic principle of operation by which PRZYGIENDA routes packets, Appellant submits that the alleged teachings of TSUCHIYA are not sufficient to render claim 10 *prima facie* obvious.

In view of the arguments above, Appellant requests that the rejection of claims 7, 10 and 11 be reversed.

2. Claims 24 and 26-28.

Claim 24 recites “[i]n a device for forwarding data packets wherein the device includes a storage having storage locations, a computer-readable medium holding computer-executable instructions for performing a method” that includes “using a first set of multiple bits from header data for a network layer packet as an index to locate a selected first one of the storage locations that stores a first instruction,” “executing the first instruction to provide, using a second set of multiple bits from the header data, a location of a second one of the storage locations that stores a second instruction,” “executing the second instruction to provide, using a third set of multiple bits from the header data, a location of a third one of the storage locations, wherein the third one of the storage locations provides a third instruction regarding



how the device should forward the network layer packet” and “executing the third instruction to forward the network layer packet toward the destination.”

On page 7, the final Office Action asserts that claim 24 has similar features to claim 10 and, therefore, is rejected in view of PRZYGIENDA and TSUCHIYA for the same reasons set forth in the rejection of claim 10. Appellant submits that the final Office Action has also failed to establish a *prima facie* case of obviousness with respect to claim 24. Particularly, Appellant submits that the references cited by the final Office Action, either singly or in combination, do not teach or suggest each and every feature of claim 24, and that the final Office Action has not provided a sufficient reason, suggestion, or motivation why one having ordinary skill in the art would modify PRZYGIENDA with the teachings of TSUCHIYA to produce the invention of claim 24.

As discussed above with respect to claim 10, TSUCHIYA discloses using an identifier of a sequence of identifiers contained in a packet header to index an entry in a forwarding table in a device memory. An instruction contained in the indexed entry is then executed to *cause the device to modify a pointer in the packet header to point to a next identifier in the sequence of identifiers stored in the packet header*. The instruction in TSUCHIYA is, thus, executed to modify a pointer that points to a next identifier in a sequence of identifiers in a packet header and is not executed to provide direction to a second forwarding lookup. TSUCHIYA, therefore, does not disclose, or even suggest, locating “a selected one of the

storage locations that stores a first instruction” and “executing the first instruction to provide, using a second set of multiple bits from the header data, a location of a second one of the storage locations that stores a second instruction, as recited in claim 24.

As noted above, PRZYGIENDA merely discloses the use of a lookup algorithm to determine a selected location in a routing table 16 that contains a longest matching prefix that matches a destination address of a packet (see column 2, line 59 – column 3, line 8). The forwarding device uses forwarding information associated with the longest matching prefix to route the packet to its next destination (column 3, lines 8-10). PRZYGIENDA, thus, discloses searching through a routing table 16 to locate an entry that contains a longest prefix that matches a destination address of a packet, and then retrieval of forwarding information associated with the entry that contains the longest prefix. PRZYGIENDA does not disclose, or even suggest, locating “a selected one of the storage locations that stores a first instruction” and “executing the first instruction to provide, using a second set of multiple bits from the header data, a location of a second one of the storage locations that stores a second instruction,” as recited in claim 24. The longest matching entry in the forwarding table of PRZYGIENDA contains a prefix that matches the destination address from a packet, and does not store an instruction that is executed to provide a location of a storage location that stores another instruction, as recited in claim 24.

Since neither TSUCHIYA, nor PRZYGIENDA, disclose the features locating “a selected one of the storage locations that stores a first instruction” and “executing the first instruction to provide, using a second set of multiple bits from the header data, a location of a second one of the storage locations that stores a second instruction,” Appellant submits that the final Office Action has failed to establish a *prima facie* case of obviousness. Reversal of the rejection of claim 24 is, therefore, requested for at least this reason.

Appellant further submits that the final Office action has not provided a sufficient reason, suggestion or motivation why one having ordinary skill in the art would modify PRZYGIENDA with the teachings of TSUCHIYA. As noted above, PRZYGIENDA discloses the use of a destination address contained in a packet header to search through a routing table to locate an entry in the table that contains a longest prefix that matches the destination address of the packet. Forwarding information associated with the entry is then retrieved for forwarding the packet on to its network destination. The disclosure of PRZYGIENDA, thus, is based on the conventional packet forwarding principles of parsing the destination address of each received packet to locate a forwarding lookup entry that contains an appropriate next forwarding hop for the packet. As noted in column 3, lines 50-65, TSUCHIYA discloses a packet forwarding technique that operates on a completely different principle than the technique disclosed in PRZYGIENDA. TSUCHIYA discloses the use of a sequence of

identifiers, inserted into the packet header, that *specify a route* for forwarding a packet hop by hop from a source to a destination (see column 3, lines 57-64).

Since PRZYGIENDA discloses a technique for forwarding packets that involves parsing a single destination address to locate a forwarding table lookup entry for routing the packet to a next hop, whereas TSUCHIYA discloses the use of a sequence of identifiers contained a packet header for identifying a next forwarding hop for a packet, Appellant submits that one having ordinary skill in the art would not have been motivated to modify the disclosure of PRZYGIENDA with the disclosure of TSUCHIYA. Given that PRZYGIENDA does not disclose the use of a sequence of identifiers in a packet header for providing a route between a source and destination, one skilled in the art would not have recognized “the advantage of using Tsuchiya’s teaching of storing an instruction at an entry in a forwarding table into the system of Przygienda in order to provide direction such as causing the pointer in the packet header to point to a different identifier” as alleged by the Office Action.

PRZYGIENDA does not disclose the use of any type of pointer in the packet header for pointing to routing identifiers within the packet header, therefore, one of ordinary skill in the art would not have combined the disclosures of PRZYGIENDA and TSUCHIYA “to provide direction such as causing the pointer in the packet head to point to a different identifier” as alleged by the final Office Action.

Furthermore, given that TSUCHIYA discloses the use of a sequence of identifiers in a packet header for routing a packet, instead of parsing a single destination address as disclosed in PRZYGIENDA, modifying PRZYGIENDA with the disclosure of TSUCHIYA would change the principle of operation of the forwarding technique disclosed in PRZYGIENDA. If a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Modifying the disclosure of PRZYGIENDA with the disclosure of TSUCHIYA, which discloses routing a packet using a sequence of identifiers contained in the packet, would change the principle of operation by which PRZYGIENDA routes packets (i.e., parsing a packet's destination address to locate an entry in a forwarding table). Since the modification of PRZYGIENDA proposed by the Office Action would change the basic principle of operation by which PRZYGIENDA routes packets, Appellant submits that the alleged teachings of TSUCHIYA are not sufficient to render claim 24 *prima facie* obvious.

In view of the arguments above, Appellant requests that the rejection of claims 24 and 26-28 be reversed.

### 3. Claims 29 and 30.

Claim 29 recites “[i]n a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address composed of a sequence of bits, said device including a first forwarding lookup and a second forwarding lookup, a computer-readable medium holding computer-executable instructions for performing a method” that includes “using a prefix of multiple bits from the destination address of the IP packet as an index to locate a first entry in the first forwarding lookup that stores a first instruction and a first set of bits,” “executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup, using a next sequential set of bits following the prefix in the destination address as an index to locate a second entry in the second forwarding lookup, said second entry having contents” and “employing the contents of the second entry in forwarding the IP packet toward the destination address.”

On page 7, the final Office Action asserts that claim 29 has similar features to claim 10 and, therefore, is rejected in view of PRZYGIENDA and TSUCHIYA for the same reasons set forth in the rejection of claim 10. Appellant submits that the final Office Action has failed to establish a *prima facie* case of obviousness with respect to claim 29. Particularly, Appellant submits that the references cited by the final Office Action, either singly or in combination, do not teach or suggest each and every feature of claim 29 and that the final Office Action has not provided a sufficient reason, suggestion, or motivation why one having ordinary skill in the art would modify PRZYGIENDA with the teachings of TSUCHIYA to produce the invention of

claim 29.

As discussed above with respect to claim 10, TSUCHIYA discloses using an identifier of a sequence of identifiers contained in a packet header to index an entry in a forwarding table in a device memory. An instruction contained in the indexed entry is then executed to *cause the device to modify a pointer in the packet header to point to a next identifier in the sequence of identifiers stored in the packet header*. The instruction in TSUCHIYA is, thus, executed to modify a pointer that points to a next identifier in a sequence of identifiers in a packet header and is not executed to provide direction to a second forwarding lookup table. TSUCHIYA, therefore, does not disclose, or even suggest, locating “a first entry in the first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup,” as recited in claim 29.

As noted above, PRZYGIENDA merely discloses the use of a lookup algorithm to determine a selected location in a routing table 16 that contains a longest matching prefix that matches a destination address of a packet (see column 2, line 59 – column 3, line 8). The forwarding device uses forwarding information associated with the longest matching prefix to route the packet to its next destination (column 3, lines 8-10). PRZYGIENDA, thus, discloses searching through a routing table 16 to locate an entry that contains a longest prefix that matches a destination address of a packet, and then retrieval of forwarding information

associated with the entry that contains the longest prefix. PRZYGIENDA does not disclose, or even suggest, locating “a first entry in the first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup,” as recited in claim 29. The longest matching entry in the forwarding table of PRZYGIENDA contains a prefix that matches the destination address from a packet, and does not store an instruction that is executed to provide direction to a second forwarding lookup, as recited in claim 29.

Since neither TSUCHIYA, nor PRZYGIENDA, disclose the features locating “a first entry in the first forwarding lookup that stores a first instruction and a first set of bits” and “executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup,” Appellant submits that the final Office Action has failed to establish a *prima facie* case of obviousness. Reversal of the rejection of claim 29 is, therefore, requested for at least this reason.

Appellant further submits that the final Office action has not provided a sufficient reason, suggestion or motivation why one having ordinary skill in the art would modify PRZYGIENDA with the teachings of TSUCHIYA. As noted above, PRZYGIENDA discloses the use of a destination address contained in a packet header to search through a routing table to locate an entry in the table that contains a longest prefix that matches the destination address of the packet. Forwarding information associated with the entry is then retrieved for



forwarding the packet on to its network destination. The disclosure of PRZYGIENDA, thus, is based on the conventional packet forwarding principles of parsing the destination address of each received packet to locating a forwarding lookup entry that contains an appropriate next forwarding hop for the packet. As noted in column 3, lines 50-65, TSUCHIYA discloses a packet forwarding technique that operates on a completely different principle than the technique disclosed in PRZYGIENDA. TSUCHIYA discloses the use of a sequence of identifiers, inserted into the packet header, that *specify a route* for forwarding a packet hop by hop from a source to a destination (see column 3, lines 57-64).

Since PRZYGIENDA discloses a technique for forwarding packets that involves parsing a single destination address to locate a forwarding table lookup entry for routing the packet to a next hop, whereas TSUCHIYA discloses the use of a sequence of identifiers contained a packet header for identifying a next forwarding hop for a packet, Appellant submits that one having ordinary skill in the art would not have been motivated to modify the disclosure of PRZYGIENDA with the disclosure of TSUCHIYA. Given that PRZYGIENDA does not disclose the use of a sequence of identifiers in a packet header for providing a route between a source and destination, one skilled in the art would not have recognized “the advantage of using Tsuchiya’s teaching of storing an instruction at an entry in a forwarding table into the system of Przygienda in order to provide direction such as causing the pointer in the packet header to point to a different identifier” as alleged by the Office Action.

PRZYGIENDA does not disclose the use of any type of pointer in the packet header for pointing to routing identifiers within the packet header, therefore, one of ordinary skill in the art would not have combined the disclosures of PRZYGIENDA and TSUCHIYA “to provide direction such as causing the pointer in the packet head to point to a different identifier” as alleged by the final Office Action.

Furthermore, given that TSUCHIYA discloses the use of a sequence of identifiers in a packet header for routing a packet, instead of parsing a single destination address as disclosed in PRZYGIENDA, modifying PRZYGIENDA with the disclosure of TSUCHIYA would change the principle of operation of the forwarding technique disclosed in PRZYGIENDA. If a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Modifying the disclosure of PRZYGIENDA with the disclosure of TSUCHIYA, which discloses routing a packet using a sequence of identifiers contained in the packet, would change the principle of operation by which PRZYGIENDA routes packets (i.e., parsing a packet's destination address to locate an entry in a forwarding table). Since the modification of PRZYGIENDA proposed by the Office Action would change the basic principle of operation by which PRZYGIENDA routes packets, Appellant submits that the alleged teachings of TSUCHIYA are not sufficient to render claim 29 *prima facie* obvious.

In view of the arguments above, Appellant requests that the rejection of claims 29 and 30 be reversed.

### VIII. CONCLUSION

For at least the foregoing reasons, it is respectfully requested that the Examiner's rejections of claims 32-34 under 35 U.S.C. §112, claims 3-5, 21-23 and 32-34 under 35 U.S.C. §102(e) and claims 7, 10, 11, 24 and 26-30 under 35 U.S.C. §103(a) be REVERSED.

Respectfully submitted,



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**APPENDIX**

**THE APPEALED CLAIMS**

The claims on appeal are as follows:

3. The method of claim 4, further comprising the step of forwarding the network layer packet based on the contents of the third selected storage location.
4. In a device for forwarding data packets, the device having a memory containing storage locations, a method comprising:
  - receiving header data of a network layer packet;
  - selecting a first one of the storage locations based on a first set of bits contained in the header data; and
  - executing an instruction stored at the first selected storage location;
  - selecting a second one of the storage locations based on the executed instruction and a second set of bits contained in the header data; and
  - selecting a third one of the storage locations based on contents of the second selected storage location and a third set of bits contained in the header data.
5. The method of claim 4 wherein the packet is an IP packet.

7. The method of claim 10 wherein the step of employing the contents of the second entry comprises executing an instruction contained in the second entry to forward the IP packet toward the destination address.

10. In a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address containing a sequence of bits, a method comprising:

using a first set of bits from the destination address of the IP packet as an index to locate a first entry in a first forwarding lookup that stores a first instruction and a first set of bits;

executing the first instruction to, using the first set of bits, provide direction to a second forwarding lookup, using a second set of bits from the destination address as an index to locate the second entry in a second forwarding lookup that stores a second instruction and a second set of bits;

executing the second instruction to provide direction, using the second set of bits, to a third forwarding lookup; and

employing a third set of bits from the destination address as an index to locate a third entry in the third forwarding lookup and employing the contents of the third entry in forwarding the IP packet.

11. The method of claim 10 wherein the device includes an application specific integrated circuit (ASIC) and wherein the ASIC performs the steps of the method.

21. A switch/router for directing IP packets toward destinations, comprising:

a first lookup array containing entries indexed by leading bits of destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination;

a second lookup array containing entries indexed by a successive set of bits that follow the leading bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet towards a destination;

a third lookup array containing entries indexed by a set of trailing bits that follow the successive set of bits in the destination addresses for IP packets, each entry containing an instruction to assist in forwarding an IP packet; and

a forwarding engine for forwarding IP packets to destinations, where for each IP packet being forwarded, said forwarding engine accesses at least one entry in the lookup arrays indexed by a portion of a destination address for the IP packet being forwarded and executing the instruction contained in the entry that is accessed.

22. The switch/router of claim 21 further comprising input ports and interface structures that

hold information regarding the input ports on which IP packets arrive.

23. The switch/router of claim 22 wherein the interface structures contain instructions for directing the forwarding engine to access the first lookup array.

24. In a device for forwarding data packets wherein the device includes a storage having storage locations, a computer-readable medium holding computer-executable instructions for performing a method, comprising:

using a first set of multiple bits from header data for a network layer packet as an index to locate a selected first one of the storage locations that stores a first instruction;

executing the first instruction to provide, using a second set of multiple bits from the header data, a location of a second one of the storage locations that stores a second instruction;

executing the second instruction to provide, using a third set of multiple bits from the header data, a location of a third one of the storage locations, wherein the third one of the storage locations provides a third instruction regarding how the device should forward the network layer packet; and

executing the third instruction to forward the network layer packet toward the destination.

26. The computer-readable medium of claim 24 where more than a byte from the destination

address is used as the index.

27. The computer-readable medium of claim 24 wherein the network layer packet contains a header and wherein the method further comprises the step of extracting the information from the header.

28. The computer-readable medium of claim 24 wherein the packet is an IP packet.

29. In a device for forwarding an Internet Protocol (IP) packet toward a destination having a destination address composed of a sequence of bits, said device including a first forwarding lookup and a second forwarding lookup, a computer-readable medium holding computer-executable instructions for performing a method, the method comprising the steps of:

using a prefix of multiple bits from the destination address of the IP packet as an index to locate a first entry in the first forwarding lookup that stores a first instruction and a first set of bits;

executing the first instruction to provide direction, using the first set of bits, to the second forwarding lookup, using a next sequential set of bits following the prefix in the destination address as an index to locate a second entry in the second forwarding lookup, said second entry having contents, and



employing the contents of the second entry in forwarding the IP packet toward the destination address.

30. The computer-readable medium of claim 29 wherein the step of employing the contents of the second entry comprises executing an instruction contained in the second entry to forward the IP packet toward the destination address.

32. The method of claim 4, further comprising:  
retrieving, from a lookup element stored in a storage location of the storage locations, multiple bits that select the first set of bits from all of the bits contained in the header data.

33. The method of claim 32, further comprising:  
retrieving, from the first one of the storage locations, multiple bits that select the second set of bits from all of the bits contained in the header data.

34. The method of claim 33, further comprising:  
retrieving, from the second one of the storage locations, multiple bits that select the third set of bits from all of the bits contained in the header data.